

Application No. 10/709,960
Docket No. A4-1786
Amendment dated February 16, 2005
Reply to Office Action of November 4, 2004

Amendments to the Claims:

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This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (currently amended): An apparatus ~~for maneuvering an~~
~~object~~ in a zero or low-gravity environment, the apparatus comprising:
means for generating a magnetic field in proximity to an orbital path in
the zero or low-gravity environment; and
an object moving ~~a moving object~~ in proximity to the generating
means and having a trajectory and speed, the object being sufficiently close to
the generating means such that the magnetic field alters at least one of the
trajectory and speed of the object to selectively inject the object into orbit along
the orbital path or eject the object from the orbital path.

Claim 2 (original): The apparatus according to claim 1, wherein the
object contains a ferrous material or an electromagnet or holds a static charge.

Claim 3 (original): The apparatus according to claim 1, wherein the

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generating means defines an opening of sufficient size to enable the object to ~~move through the opening~~
move through the opening.

Claim 4 (currently amended): The apparatus according to claim 3,
wherein the generating means is configured for passage ~~operable to alter only~~
~~the speed~~ of the object completely ~~as the object passes~~ through ~~the opening~~
of the generating means.

Claim 5 (original): The apparatus according to claim 4, wherein the
generating means is operable to decelerate the object.

Claim 6 (original): The apparatus according to claim 4, wherein the
generating means is operable to accelerate the object.

Claim 7 (currently amended): The apparatus according to claim 1,
wherein the generating means comprises a coil that defines an opening and the
coil ~~generating means~~ is operable to alter only the trajectory of the object as
the object moves past but not through the opening.

Claim 8 (original): The apparatus according to claim 1, wherein the

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generating means comprises at least one coil.

Claim 9 (currently amended): The apparatus according to claim 1, wherein the generating means comprises a plurality of ~~coils~~ concentrically aligned coils, each of the concentrically-aligned coils generating a magnetic field that alters the speed of the object.

Claim 10 (currently amended): The apparatus according to claim 9, wherein the concentrically-aligned ~~plurality of~~ coils have decreasing sizes in one direction of their concentric alignment.

Claim 11 (currently amended): The apparatus according to claim 1, wherein the generating means comprises a plurality of coils aligned along an arcuate path, each of the arcuately-aligned coils generating a magnetic field that alters at least the trajectory of the object.

Claim 12 (currently amended): The apparatus according to claim 11, wherein each of the arcuately-aligned coils has an axis, the axes of the arcuately-aligned coils are aligned as radii of a circle, and the magnetic fields of the arcuately-aligned coils push the object away from the arcuately-aligned

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coils or pull the object toward the arcuately-aligned coils.

Claim 13 (currently amended): The apparatus according to claim 11, wherein each of the arcuately-aligned coils has an axis, the axes of the arcuately-aligned coils are aligned as radii of a spiral, and the magnetic fields of the arcuately-aligned coils ~~push~~ ~~pull~~ the object away from ~~toward~~ the arcuately-aligned coils or pull the object toward the arcuately-aligned coils.

Claim 14 (original): The apparatus according to claim 1, wherein the generating means comprises means for controlling the attitude of the generating means relative to the object.

Claim 15 (original): The apparatus according to claim 1, wherein the generating means comprises means for receiving and sending communications.

Claim 16 (original): The apparatus according to claim 1, wherein the generating means comprises:

means for receiving and sending communications; and

means for controlling the attitude of the generating means relative to

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the object in response to the communications received by the receiving and sending means.

Claim 17 (original): The apparatus according to claim 1, wherein the generating means comprises means for capturing and storing energy of a back-emf pulse created as the object enters the magnetic field generated by the generating means.

Claim 18 (original): The apparatus according to claim 1, wherein the generating means comprises means for capturing and storing solar energy.

Claim 19 (currently amended): An apparatus for maneuvering an object having a trajectory and speed in a zero or low-gravity environment, the apparatus comprising:

a plurality of coils aligned, separated, and spaced apart from each other along a path, each coil generating a magnetic field in the zero or low-gravity environment; and

wherein the coils are oriented and spaced along the path so that their magnetic fields cooperate to alter the trajectory and speed of the object as the object moves in proximity to the path.

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~~a moving object in proximity to the coil and having a trajectory and speed, the object containing a ferrous material or an electromagnet or holds a static charge and being sufficiently close to at least one of the coils such that the magnetic field of the coil alters at least one of the trajectory and speed of the object.~~

Claim 20 (currently amended): The apparatus according to claim 19, wherein at least some of the coils are concentrically aligned, each of the concentrically-aligned coils defines an opening of sufficient size to enable the object to move through the opening, and the apparatus alters the speed of the object as the object successively passes through the openings of the concentrically-aligned coils.

Claim 21 (currently amended): The apparatus according to claim 20, wherein at least a portion of the path is an orbital path. ~~the apparatus is a orbital payload catcher.~~

Claim 22 (currently amended): The apparatus according to claim 20, wherein ~~the apparatus is a orbital payload catcher and launcher, and the~~ apparatus further comprises means for capturing and storing energy of a back-

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emf pulse created as the object enters the magnetic fields ~~field~~ generated by the concentrically-aligned coils.

Claim 23 (currently amended): The apparatus according to claim 19, wherein at least some of the coils are aligned along an arcuate path, each of the arcuately-aligned coils has an axis, the axes of the arcuately-aligned coils are aligned as radii of a circle, and the magnetic fields of the arcuately-aligned coils push the object away from the arcuately-aligned coils or pull the object toward the arcuately-aligned coils so as to alter the trajectory of the object.

Claim 24 (currently amended): The apparatus according to claim 19, wherein at least some of the coils are aligned along an arcuate path, ~~the~~ each of the arcuately-aligned coils has an axis, the axes of the arcuately-aligned coils are aligned as radii of a spiral, and the magnetic fields of the arcuately-aligned coils push ~~pull~~ the object away from ~~toward~~ the arcuately-aligned coils or pull the object toward the arcuately-aligned coils so as to alter the trajectory of the object.

Claim 25 (currently amended): A method of transferring ~~maneuvering~~ an object to an orbital path in a zero or low-gravity environment,

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the method comprising the steps of:

generating a magnetic field in proximity to the orbital path; ~~the zero or~~
~~low-gravity environment;~~ and
causing the object to move with ~~moving an object having~~ a trajectory
and speed in proximity to the magnetic field, the object being sufficiently close
to the magnetic field such that the magnetic field alters at least one of the
trajectory and speed of the object to inject the object into orbit along the orbital
path.

Claim 26 (original): The method according to claim 25, wherein the
magnetic field is generated by at least one coil defining an opening and the
magnetic field alters the speed of the object as the object moves through the
opening.

Claim 27 (original): The method according to claim 26, wherein the
magnetic field decelerates the object.

Claim 28 (currently amended): The method according to claim 25,
further comprising the step of accelerating the object with the magnetic field to
cause the object to leave the orbital path. ~~claim 27, wherein the magnetic field~~

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~~accelerates the object.~~

Claim 29 (currently amended): A method of maneuvering an object in a zero or low-gravity environment, the method comprising the steps of: ~~The method according to claim 25~~

generating a magnetic field in the zero or low-gravity environment,
wherein the magnetic field is generated by at least one coil defining an opening
and
causing the object to move with a trajectory and speed in proximity to the magnetic field, the object being sufficiently close to the magnetic field such that the magnetic field alters the trajectory of the object as the object moves past but not through the opening.

Claim 30 (currently amended): The method according to claim 25,
wherein a plurality of magnetic fields are generated by a plurality of ~~coils~~
concentrically aligned coils, each of the concentrically-aligned coils generating a magnetic field that alters the speed of the object to inject the object into orbit along the orbital path.

Claim 31 (currently amended): The method according to claim 30,

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wherein the concentrically-aligned ~~plurality of~~ coils have decreasing sizes in one direction of their concentric alignment.

Claim 32 (currently amended): The method according to claim 29, ~~claim 25~~, wherein a plurality of magnetic fields are generated by a plurality of coils aligned along an arcuate path, each of the arcuately-aligned coils generating a magnetic field that alters at least the trajectory of the object as the object moves past but not through openings of the arcuately-aligned coils.

Claim 33 (currently amended): The method according to claim 32, wherein each of the arcuately-aligned coils has an axis, the axes of the arcuately-aligned coils are aligned as radii of a circle, and the magnetic fields of the arcuately-aligned coils push the object away from the arcuately-aligned coils or pull the object toward the arcuately-aligned coils.

Claim 34 (currently amended): The method according to claim 32, wherein each of the arcuately-aligned coils has an axis, the axes of the arcuately-aligned coils are aligned as radii of a spiral, and the magnetic fields of the arcuately-aligned coils push ~~pull~~ the object away from ~~toward~~ the arcuately-aligned coils or pull the object toward the arcuately-aligned coils.

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Claim 35 (original): The method according to claim 25, further comprising the step of controlling the orientation of the magnetic field relative to the object.

Claim 36 (original): The method according to claim 25, further comprising the steps:
receiving and sending communications; and
controlling the orientation of the magnetic field relative to the object in response to the received communications.

Claim 37 (original): The method according to claim 25, further comprising the step of capturing and storing energy of a back-emf pulse created as the object enters the magnetic field.

Claim 38 (original): The method according to claim 25, further comprising the step of capturing and storing solar energy.

Claim 39 (currently amended): A method of maneuvering an object having a trajectory and speed in a zero or low-gravity environment, the method comprising the steps of:

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providing a plurality of coils aligned, separated, and spaced apart from each other, each coil generating a magnetic field in the zero or low-gravity environment; and

causing the object to move ~~moving an object having a trajectory and speed~~ in proximity to each of the coils, the object passing the coil, the object containing a ferrous material or an electromagnet or holds a static charge and being sufficiently close to each ~~at least one~~ of the coils such that the magnetic fields thereof cooperate to alter ~~field of the coil alters at least one of the~~ trajectory and speed of the object.

Claim 40 (currently amended): The method according to claim 39, wherein at least some of the coils are concentrically aligned, each of the concentrically-aligned coils defines an opening of sufficient size to enable the object to move through the opening, and the speed of the object is altered as the object passes successively through the openings of the concentrically-aligned coils.

Claim 41 (currently amended): The method according to claim 40, wherein the causing step injects the object into orbit along an orbital path. ~~object is caught by the plurality of coils.~~

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Claim 42 (currently amended): The method according to claim 41,
further comprising the steps of:

capturing and storing energy of a back-emf pulse created as the
object enters the magnetic field of each of the coils; and
~~ejecting -launching-~~ the object from the orbital path with the coils using
the energy.

Claim 43 (currently amended): The method according to claim 41,
wherein at least some of the coils are aligned along an arcuate path, each of
the arcuately-aligned coils has an axis, the axes of the arcuately-aligned coils
are aligned as radii of a circle, and the magnetic fields of the arcuately-aligned
coils push the object away from the arcuately-aligned coils or pull the object
toward the arcuately-aligned coils so as to alter the trajectory of the object.

Claim 44 (currently amended): The method according to claim 41,
wherein at least some of the coils are aligned along an arcuate path, ~~the~~ each
of the arcuately-aligned coils has an axis, the axes of the arcuately-aligned coils
are aligned as radii of a spiral, and the magnetic fields of the arcuately-aligned
coils push ~~pull~~ the object away from ~~toward~~ the arcuately-aligned coils or pull
the object toward the arcuately-aligned coils so as to alter the trajectory of the

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object.